

**What is claimed is:**

1. An isolated nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide comprising a 3'-5' exonuclease domain, and wherein said polypeptide is identical or substantially similar to an amino acid sequence of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:22, SEQ ID NO:10, SEQ ID NO:12, or SEQ ID NO:24.
2. The isolated nucleic acid molecule according to claim 1, wherein said 3'-5' exonuclease domain is an RNase D related domain.
3. The isolated nucleic acid molecule according to claim 1, wherein said polypeptide has 3'-5' exonuclease activity.
4. An isolated nucleic acid molecule comprising a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, or SEQ ID NO:13, or SEQ ID NO:23.
5. An isolated nucleic acid molecule comprising a nucleotide sequence of SEQ ID NO:23 or complements thereof.
6. The isolated nucleic acid molecule according to claim 1, wherein the nucleotide sequence is obtained or derived from a plant.
7. An isolated nucleic acid molecule consisting of the nucleotide sequence of SEQ ID NO:23 or complement thereof.
8. An isolated recombinant nucleic acid molecule comprising a nucleic acid molecule of claim 1 or complement thereof operatively linked to a promoter functional in a cell.
9. The isolated recombinant nucleic acid molecule according to claim 8, wherein the promoter is functional in a plant cell.
10. The isolated recombinant nucleic acid molecule according to claim 8, wherein the nucleic acid molecule of claim 1 is in sense orientation.
11. The isolated recombinant nucleic acid molecule according to claim 8, wherein the nucleic acid molecule of claim 1 is in anti-sense orientation..

09896186 062901

12. An expression cassette comprising a nucleic acid molecule comprising a nucleotide sequence encoding a polypeptide comprising a 3'-5' exonuclease domain, and wherein said polypeptide is identical or substantially similar to an amino acid sequence of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:22, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:16, SEQ ID NO:18, or SEQ ID No:24, a promoter, and a terminator.
13. The expression cassette according to claim 12, wherein said promoter is a constitutive promoter, an inducible promoter, a tissue-specific promoter or a developmentally-regulated promoter.
14. A vector comprising the nucleic acid molecule of claim 1.
15. A vector comprising the nucleic acid molecule of claim 4.
16. An isolated and substantially purified polypeptide comprising the amino acid sequence of SEQ ID NO:24.
17. An isolated and substantially purified polypeptide consisting of the amino acid sequence of SEQ ID NO:24.
18. A cell comprising the nucleic acid molecule of claim 1.
19. A cell comprising the expression cassette according to claim 12.
20. The cell according to claim 19, wherein the cell is a plant cell.
21. The cell of claim 19, wherein the nucleic acid molecule comprising the nucleotide sequence encoding a polypeptide comprising a 3'-5' exonuclease domain is expressed in the cell.

09896186-062901

22. The plant cell according to claim 20, further comprising an endogenous nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23.

23. The plant cell according to claim 21, wherein the expression of said endogenous nucleotide sequence in said plant cell is altered.

24. The plant cell according to claim 21, wherein said plant cell further comprises a nucleotide sequence of interest, wherein the expression of the nucleotide sequence of interest in the plant cell is altered as compared to the expression of the nucleotide sequence of interest in a plant cell lacking the expression cassette.

25. A plant cell comprising an endogenous nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23, and wherein said plant cell comprises a mutation in said endogenous nucleotide sequence, or in a regulatory region thereof.

26. The plant cell of claim 25, wherein the mutation is due to an insertion of a nucleic acid molecule.

27. The plant cell according to claim 25, wherein the insertion of a nucleic acid molecule comprises one T-DNA border region.

28. 29. The plant cell according to claim 25, wherein the insertion comprises a transposable element.

29. 30. The plant cell according to claim 25, wherein the expression of said endogenous nucleotide sequence in said plant cell is reduced.

30. 31. The plant cell according to claim 19, wherein said plant cell further comprises a second expression cassette comprising a nucleic acid molecule of interest, wherein the expression of the nucleic acid molecule of interest in said plant cell is stabilized or increased as compared to the expression of nucleic acid molecule of interest in a plant cell lacking said the first expression cassette.

- Sub  
B2

32  
Cont 39 40. A plant comprising the plant cell of claim 26, or progeny thereof, or seeds thereof.

40 41. A plant comprising the plant cell of claim <sup>30</sup>31, or progeny thereof, or seeds thereof.

41 42. A plant comprising the plant cell of claim <sup>32</sup>33, or progeny thereof, or seeds thereof.

42 43. A plant comprising the plant cell of claim <sup>35</sup>36, or progeny thereof, or seeds thereof.

43 44. A method for altering the expression in a plant cell or plant of an endogenous nucleotide sequence encoding a polypeptide comprising a 3'-5' exonuclease domain, wherein said polypeptide is identical or substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:22, SEQ ID NO:10, SEQ ID NO:12 or SEQ ID NO:24 comprising the step of:  
altering the transcription or translation of said endogenous nucleotide sequence in said plant cell or plant.

44 45. The method according to claim <sup>45</sup>44, wherein altering the transcription or translation of said endogenous nucleotide sequence in the plant cell or plant comprises the step of:

a) expressing in said plant cell a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23, or a portion thereof, in sense orientation; or

b) expressing in said plant cell a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23, or a portion thereof, in anti-sense orientation; or

c) expressing in said plant cell a sense RNA of a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23, or a portion thereof, and an anti-sense RNA of said nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23, or a portion thereof, wherein said sense and said anti-sense RNAs are capable of forming a double-stranded RNA molecule; or

- d) expressing in said plant cell a ribozyme capable of specifically cleaving a messenger RNA transcript encoded by a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23; or
- e) modifying by homologous recombination in said plant cell at least one chromosomal copy of the nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23 or of a regulatory region thereof; or
- f) expressing in said plant cell a zinc finger protein that is capable of binding to a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23 or to a regulatory region thereof; or
- g) introducing into said plant cell a chimeric oligonucleotide that is capable of modifying at least one chromosomal copy of the nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23 or a regulatory region thereof.

45 46. A method for altering the expression of an endogenous nucleotide sequence that is identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23 in a plant cell or plant comprising the step of introducing into said plant cell a means for altering the transcription or translation of said endogenous nucleotide sequence in said plant cell.

46 47. A method for altering the expression of a nucleotide sequence of interest in a plant cell or plant comprising the steps of:

a) altering the expression in said plant cell or plant of an endogenous nucleotide sequence of said plant cell that is identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23; and

b) introducing into said plant cell or plant a nucleic acid molecule comprising said nucleotide sequence of interest, wherein the expression of said nucleotide sequence of interest in said plant cell or plant is altered.

47 48. The method according to claim 47, wherein step a) comprises:

B4  
cont.

- a) expressing in said plant cell or plant a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17, or SEQ ID NO:23, or a portion thereof, in sense orientation; or
- b) expressing in said plant cell or plant a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23, or a portion thereof, in anti-sense orientation; or
- c) expressing in said plant cell or plant a sense RNA of a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17, or SEQ ID NO:23, or a portion thereof, and an anti-sense RNA of a nucleotide sequence substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15 or SEQ ID NO:17, or SEQ ID NO:23 or a portion thereof, where said sense and said anti-sense RNAs are capable of forming a double stranded RNA molecule; or
- d) expressing in said plant cell or plant a ribozyme capable of specifically cleaving a messenger RNA transcript encoded by a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23; or
- e) modifying by homologous recombination in said plant cell or plant at least one chromosomal copy of the nucleotide sequence substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23 or of a regulatory region thereof; or
- f) expressing in said plant cell or plant a zinc finger protein that is capable of binding to a nucleotide sequence substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23 or to a regulatory region thereof; or
- g) introducing into said plant cell or plant a chimeric oligonucleotide that is capable of modifying at least one chromosomal copy of the nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23 or a regulatory region thereof

48 49. A method for altering or stabilizing the expression of a nucleotide sequence of interest in a plant cell or plant comprising the steps of:

- a) obtaining a plant cell comprising a first expression cassette according to claim 12 or plant thereof; and
- b) introducing into said plant cell or plant a second nucleic acid molecule comprising said nucleotide sequence of interest, wherein the expression of said nucleotide sequence of interest in said plant cell is altered or stabilized as compared to the expression of said nucleotide sequence of interest in a plant cell or plant lacking said first expression cassette.

49 50. The method of claim 49, wherein the expression of the nucleotide sequence of interest is increased.

50 51. The method of claim 49, wherein the expression of the nucleotide sequence of interest is reduced.

51 52. A method for stabilizing the expression of a nucleotide sequence of interest in a plant cell or plant comprising the steps of:

a) obtaining a plant cell or plant having altered expression in a plant cell of an endogenous nucleotide sequence of said plant cell or plant that encodes a polypeptide comprising a 3'-5' exonuclease domain, and wherein said polypeptide is identical or substantially similar to an amino acid sequence of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:22, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, or SEQ ID NO:24; and

b) introducing into said plant cell or plant a nucleotide sequence of interest, wherein the expression of said nucleotide sequence of interest in said plant cell is stabilized as compared to the expression of said nucleotide sequence of interest in a plant cell or plant lacking said first expression cassette.

52 53. The method according to claim 52, wherein said endogenous nucleotide sequence is identical or substantially similar to a nucleotide sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23.



BS  
cont

53 54 5) The method according to claim 52, wherein the expression of said endogenous nucleotide sequence is altered by:

- a) expressing in said plant cell a nucleotide sequence substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17 or SEQ ID NO:23, or a portion thereof, in sense orientation; or
- b) expressing in said plant cell a nucleotide sequence substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13 or SEQ ID NO:23, or a portion thereof, in anti-sense orientation; or
- c) expressing in said plant cell a sense RNA of a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23 or a portion thereof, and an anti-sense RNA of said nucleotide sequence substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23 or a portion thereof, wherein said sense and said anti-sense RNAs are capable of forming a double-stranded RNA molecule; or
- d) expressing in said plant cell a ribozyme capable of specifically cleaving a messenger RNA transcript encoded by a nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13; or SEQ ID NO:23 or
- e) expressing in said plant cell an aptamer specifically directed to a polypeptide substantially similar to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:22, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14; or SEQ ID NO:24 or
- f) modifying by homologous recombination in said plant cell at least one chromosomal copy of the nucleotide sequence identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23 or of a regulatory region thereof; or
- g) expressing in said plant cell a zinc finger protein that is capable of binding to a nucleotide sequence substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23 or to a regulatory region thereof; or
- h) introducing into said plant cell a chimeric oligonucleotide that is capable of modifying at least one chromosomal copy of the nucleotide sequence

*B5*  
*can*  
54 ~~55.~~ ~~identical or substantially similar to SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:5, SEQ ID NO:21, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, or SEQ ID NO:23 or a regulatory region thereof.~~

~~54~~ ~~55.~~ ~~The method according to claim <sup>53</sup>~~54~~, wherein the expression in a plant cell of said endogenous nucleotide sequence is reduced.~~

~~54~~ ~~56.~~ ~~A method for identifying a compound capable of interacting with a polypeptide comprising a 3'-5' exonuclease domain comprising:~~  
~~a) combining a polypeptide comprising the amino acid sequence set forth in SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:22, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18, or SEQ ID NO:24 or a homolog thereof, and a compound to be tested for the ability to interact with said polypeptide, under conditions conducive to interaction; and~~  
~~b) selecting a compound from step (a) that is capable of interacting with said polypeptide.~~

~~56~~ ~~57.~~ ~~A compound identifiable by the method of claim <sup>55</sup>~~56~~.~~

~~57~~ ~~58.~~ ~~A compound identifiable by the method of claim <sup>55</sup>~~58~~, wherein said compound is capable of altering the activity of said polypeptide.~~

*58*  
*58* ~~59.~~ ~~A plant cell of claim 25, wherein the mutation is a deletion or rearrangement.~~

*59* ~~60.~~ ~~A plant cell of claim 25, wherein the mutation is a point mutation.~~

T06290" 98T96860